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Relationship of personality traits with stigmatization, depression, and quality of life in patients with multiple sclerosis

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Abstract

Background & Objective: Personality traits are associated with mental health and quality of life in patients with multiple sclerosis (MS). The aim of this study was to determine personality traits in patients with MS and to examine the relationship between these traits and stigmatization, depression and quality of life. *Method:* This descriptive, cross-sectional study included 80 MS patients and 96 healthy controls. Data were collected online between June and July 2022. Patient/person information form, Eysenck Personality Questionnaire Revised-Short Form (EPQ-RS), Neuro Quality of Life-Stigma Scale, Beck Depression Inventory and MS Quality of Life Scale-54 were used for data collection. *Results:* When the age variable was controlled, it was found that the mean neuroticism subscale score was higher ($p=0.003$) and the mean extraversion subscale score was lower ($p=0.018$) than the control group. In addition, the mean extraversion score was found to be negatively correlated with stigmatization ($p<0.05$) and depression ($p<0.01$), and positively correlated with the physical sub-dimension of quality of life ($p<0.01$). Neuroticism and psychoticism sub-dimensions were positively correlated with stigmatization and depression and negatively correlated with all sub-dimensions of quality of life ($p<0.01$). In addition, regression analysis showed that depression significantly contributed to the physical health dimension of quality of life and neuroticism personality trait significantly contributed to the mental health dimension.
Conclusions: Neurotic personality traits were found to be more dominant in patients with MS. Moreover, all sub-dimensions of personality traits were associated with stigmatization, depression and quality of life. Therefore, personality traits should be considered in interventions to improve mental health and quality of life.

Keywords: Multiple sclerosis, personality traits, stigmatization, depression, quality of life

INTRODUCTION

Multiple sclerosis (MS) is a progressive, inflammatory and demyelinating disease characterized by attacks and remissions, that affect the central nervous system.[1] The chronic and progressive nature of MS affects the patient physically, emotionally and socially. It requires patients to use coping strategies and adaptive lifestyle skills effectively and to adapt to the disease. In MS patients, disease adaptation is associated with many sociodemographic and clinical factors, with personality traits being one of these factors.[2,3]

Personality is defined as the unchanging, easy, more permanent thoughts, behaviors and relationships of individuals with others.[4] Personality is a condition that should be considered from the moment of diagnosis in chronic diseases such as MS where adaptation to the disease is important. Because studies have reported that personality traits affect self-management strategies, disease adaptation and treatment in MS patients.[5,6] It has also been reported that neuroticism personality trait is more dominant in MS patients and is associated with anxiety and depressive mood.[7-10] Recent studies have shown that neuroticism is associated with impaired physical disability, cognitive functioning and mental resilience.[3,11,12] Conversely, positive personality traits such as extraversion, conscientiousness and openness

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have been reported to be protective factors against physical and neuropsychiatric symptoms.[13,14] In the light of these data, it can be said that personality traits affect the quality of life in a direct or indirect way. Although personality traits and quality of life have not been frequently studied in MS patients, some studies support this statement.[3,7,15,16] It can be said that there is an increase in studies investigating the relationship between personality traits and physical and psychosocial symptoms in patients with MS. However, the relationship between personality traits and stigmatization, which deeply affects the adaptation to the disease and quality of life of patients, has not been studied. It is reported that stigmatization is one of the most important barriers against help seeking behavior in chronic diseases and seriously affects the well-being and quality of life of patients.[17,18] In studies conducted in different chronic diseases, it has been emphasized that stigmatization is related to personality traits and this should be taken into account in the health care of patients.[18-20] Although research on stigmatization in patients with MS has increased, no study has yet examined its relationship with personality traits. It can be predicted that negative personality traits of individuals may predispose them to depressive mood and increase stigmatization. Therefore, the aim of this study was to determine the personality traits in MS patients and to examine their relationship with stigmatization, depression and quality of life.

METHODS

Study design and participants

This descriptive, case-control study included MS patients registered in the neurology outpatient clinic of a university hospital. The study sample consisted of 80 MS patients diagnosed with MS (according to McDonald's criteria[21]), older than 18 years of age, who agreed to participate in the study and who did not have other chronic diseases other than MS (heart failure, major depression) that could seriously affect the quality of life. In addition, 96 healthy individuals over 18 years of age without any chronic health problems that could affect their quality of life were included in the study in order to compare the data of MS patients with the healthy control group.

Measures

Data were collected using the Patient/Person Information Form, Eysenck Personality Questionnaire Revised-Short Form, NeuroQoL-Stigma Scale, Beck Depression Inventory and Multiple Sclerosis Quality of Life Scale-54 forms.

Patient/Person Information Form: This form includes sociodemographic (age, gender, education, marital status, etc.) and disease-related information (questions related to diagnosis and treatment asked only to MS patients).

Eysenck Personality Questionnaire Revised-Short Form (EPQ-RS): It was developed as 48 items by Eysenck et al.(1985)[23], and then a short form was created by Francis *et al*.[22] The questionnaire was adapted to the Turkish population by Karanci *et al*.[24] The questionnaire consists of 24 questions and four subscales (neuroticism, psychoticism, extraversion and lie). The lie subscale allows the validity of the whole scale to be tested. A high score in any subscale indicates that personality trait is dominant.

NeuroQoL-Stigma Scale: The five-point Likert-type scale consisting of 24 questions and was developed by the National Institute of Neurological Diseases and Stroke.[25] The score that can be obtained from the scale varies between 24 and 120. A high score indicates that the level of stigmatization that patients are exposed to or feel due to their illness is high. The Turkish validity and reliability of the scale was conducted by Karşıdağ *et al*. (2019) and the Cronbach's alpha coefficient was found to be 0.95.[26]

Beck Depression Inventory-II (BDI-II): The scale with 21 items in total was developed by Beck *et al*.[27] The Turkish adaptation of the scale was made by Kapci *et al*.[28] The scale measures the severity of depressive mood. The total score that can be obtained from the scale ranges from 0 to 63, and a high score indicates a depressive mood. The scale measures the severity of depressive mood. The total score that can be obtained from the scale ranges from 0 to 63, and a high score indicates a depressive mood.

Multiple Sclerosis Quality of Life Scale-54: Multiple Sclerosis Quality of Life Scale-54 (MSQoL-54): It was developed in English by Vickrey et al. in 1995 to assess the quality of life of patients with MS[29]; Turkish adaptation by İdiman *et al*.[30] A score between 0-100 is taken from the scale, which has two main sub-dimensions: physical health composite (PHC) and mental health composite (MHC). An increase in

the score obtained from the scale indicates good quality of life.

Statistical analysis

The sociodemographic and clinical characteristics of the patients and control group were presented as numbers and percentages. The mean and standard deviations of the scales used were given. After testing the data for conformity to normal distribution, it was determined that the data did not conform to normal distribution and non-parametric tests were used. Chi-square analysis, Mann-Whitney U test, and ANOVA analysis were used. The results were evaluated at the 95% confidence interval and the significance level of $p<0.05$. The relationships between the scales were analyzed by Spearman correlation analysis. Regression analysis was also performed. Significance was evaluated at $p<0.05$ level.

Ethics

Ethical approvals were obtained from the Clinical Research Ethics Committee of Samsun Ondokuz Mayıs University (Ethical No: 2022/142). In addition, all individuals included in the study were included after the necessary information was provided and a written consent form was obtained.

RESULTS

The mean age of the patients was 43.01 (±11.22), 66.3% were female, and half (50.0%) were not actively working. The mean duration of diagnosis was 12.3 (±8.2) years. It was determined that 75% of the patients were ambulatory (did not use assistive devices for movement). Among the patients, 26%, 21.2%, and 7.5% reported that their personal life, work life, and school life were negatively affected by MS, respectively. When the sociodemographic characteristics of the individuals in the control group were evaluated, the mean age was 38.84 (±14.2), and there was no significant difference between the control group and MS patients in terms of sociodemographic data except for the age variable ($p=0.006$) (Table 1).

Significant differences were found in the mean scores in the personality traits subscale between the MS patients and the control group. The mean neuroticism subscale score of MS patients was higher ($p=0.003$) and the mean extraversion score was lower ($p=0.018$) than the control group. The mean psychoticism subscale score was similar in both groups ($p=0.786$) (Table 2).

When personality traits were compared with sociodemographic data, it was found that there was no significant difference according to age, gender, educational status and employment status ($p>0.05$). However, it was found that psychoticism score was significantly different according to marital status and was higher in widow/divorced patients ($p=0.003$). In addition, it was found that patients who stated that they had problems in school life due to MS had higher neuroticism scores ($p=0.021$), while those who stated that they had problems in work ($p=0.006$) and private life ($p<0.001$) had higher psychoticism scores (Table 3).

Extraversion subscale was negatively correlated with depression ($p<0.01$) and stigmatization ($p<0.05$) and positively correlated with the physical health subscale of quality of life ($p<0.01$). Neuroticism and psychoticism subscales were both positively correlated with depression and stigmatization and negatively correlated with quality of life ($p<0.01$) (Table 4).

In the first step of the regression analysis, only personality traits sub-dimensions were included in the analysis. As a result of the analysis, the effect of all subscales on quality of life was found to be significant ($p<0.05$). Then, depression and stigmatization variables were included in the analysis at the 2nd step. Regression analysis showed that depression ($p=0.004$) significantly contributed to QoL-PLC and neuroticism personality trait ($p=0.001$) significantly contributed to QoL-PLC (Table 5).

DISCUSSION

It is known that personality traits are closely related to the general well-being and quality of life of individuals, regardless of whether they are healthy or sick. Personality traits are the feelings, thoughts and behaviors of an individual that do not change quickly and make the individual different. These traits have been reported to affect the general well-being and quality of life even in healthy individuals.[31] Determination of personality traits may be more important in vulnerable patients with chronic diseases such as MS. In this study, the relationship between personality traits and depression, stigmatization and quality of life in MS patients was investigated.

As a result of this study, it was observed that the neuroticism score of MS patients was higher than the control group; in other words, neurotic personality traits were more dominant. Neuroticism personality trait is defined as being prone to anxiety, fear, depression, insecurity and

Table 1: Sociodemographic and clinical features

	MS n=80	%	Control n=96	%	p
Age (mean±sd)	43.01±11.22		38.84±14.21		**0.006**
Diagnosis time (mean±sd)	12.23±8.27		-		-
Gender					
Female	53	66.3	62	64.6	
Male	27	33.8	34	35.4	0.472
Marital status					
Single	16	20.0	23	24.0	
Married	59	73.8	71	74.0	
Divorced	5	6.3	2	2.1	0.331
Educational status					
Primary education	28	35.0	33	34.4	
High school	17	21.3	19	19.8	
University and above	35	43.8	44	45.8	0.955
Working status					
Working actively	38	47.5	49	51.0	
Not working actively	40	50.0	44	45.8	0.848
Unemployed	2	2.5	3	3.2	
Do you use assistive devices?					
Yes	20	25.0			
No	60	75.0	-	-	
Have you had any problems in your school life due to MS?					
Yes	6	7.5		-	
No	74	92.5			
Have you had any problems in your work life due to MS?				-	
Yes	17	21.2			
No	63	78.8			
Have you had problems in your private life due to MS?				-	
Yes	21	26.2			
No	59	73.8			

Table 2: Comparison of age-adjusted mean scores of scales between the patients with multiple sclerosis and healthy controls

	MS (N=80) Mean±sd (min-max)	Control (N=96) Mean±sd(min-max)	p
EPQ-RS_extraversion	3.03±1.21 (0-5)	3.45±1.09 (1-6)	**0.018**
EPQ-RS_neuroticism	3.66±1.84 (0-6)	2.96±1.65(0-6)	**0.003**
EPQ_psychoticism	2.91±1.02 (0-6)	2.87±0.79 (1-4)	0.786
BDI-II	14.28±8.69 (0-42)	10.36±7.88 (0-33)	**0.002**
Stigma	39.43±16.13(24.0-111.0)	-	
QoL-PHC	54.40±21.30 (13.71-93.92)	-	
QoL-MHC	52.32±16.22 (6.20-85.0)	-	

Note: EPQ-RS: Eysenck Personality Questionnaire-Revised Short Form, BDI-II: Beck Depression Inventory, QoL-PHC: Multiple Sclerosis Quality of Life-Physical Health Composite, QoL-MHC: Multiple Sclerosis Quality of Life-Mental Health Composite

Table 3: Comparison of personality traits in MS patients according to sociodemographic and clinical characteristic (N=80)

	Neuroticism Mean±sd p	Extraversion Mean±sd p	Psychoticism Mean±sd p
Age (r,p)	r= -0.169 p=0.133	r= -0.172 p= 0.128	r = 0.059 p= 0.605
Diagnosis time (r,p)	r= -0.027 p= 0.812	r= -0.049 p= 0.668	r = 0.044 p= 0.695
Gender			
Woman	3.52±1.87	3.05±1.18	2.86±0.92
Male	3.92±1.79	3.00±1.30	3.00±1.20
	0.361	0.850	0.621
Marital status			
Single	3.69±1.54	3.33±1.13	3.15±0.96
Married	3.11±1.80	3.23±1.16	2.76±0.83
Divorced	4.14±2.03	3.57±1.51	3.71±1.25
	0.087	0.698	**0.003**
Educational status			
High school and lower	3.35±1.73	3.32±1.11	2.98±0.98
University and above	3.20±1.83	3.18±1.23	2.77±0.78
	0.586	0.435	0.104
Working status			
Working actively	3.27±1.86	3.16±1.21	2.86±0.97
Not working actively	3.26±1.70	3.39±1.09	2.92±0.84
Unemployed	3.80±1.64	3.00±1.41	2.80±0.44
	0.805	0.378	0.869
Do you use assistive devices?			
Yes	3.66±1.81	3.05±1.26	2.85±1.07
No	3.65±1.98	3.001.07	3.10±1.21
	0.974	0.864	0.366
Have you had any problems in your school life because of MS?			
Yes	5.00±1.09	2.0 ±0.63	3.66±1.21
No	3.55±1.85	3.12±1.21	2.85±0.98
	0.021	**0.005**	0.163
Have you had any problems in your work life due to MS?			
Yes	4.05±1.81	2.70±1.31	3.58±1.06
No	3.55±1.85	3.12±1.18	2.73±0.93
	0.323	0.243	**0.006**
Have you had problems in your private life due to MS?			
Yes	4.23± 1.64	2.80±1.32	3.76± 1.04
No	3.45±1.88	0.352	2.61±0.83
	0.080	0.352	**<0.001**

negative emotions.[7] In other words, neuroticism refers to the use of maladaptive strategies and the predominance of negative affect in the face of a particular event. A recent research paper highlighted that neurotic personality traits are associated with reduced function in the dorsomedial prefrontal cortex of the brain and its connection to the amygdala.[32] Similarly,

Table 4: Relationship between personality traits and other scales in MS patients (*n=80*)

Variables	SpearmaCn rho						
	1	2	3	4	5	6	7
1. Extraversion	1.00						
2. Neuroticism	0.02	1.00					
3. Psychoticism	-0.11	0.38**	1.00				
4. Depression	-0.28**	0.60**	0.54**	1.00			
5. Stigma	-0.24*	0.37**	0.48**	0.66**	1.00		
6. QoL-PHC	0.33**	-0.44**	-0.39**	-0.67**	-0.58**	1.00	
7. QoL-MHC	0.16	-0.51**	-0.35**	-0.54**	-0.44**	0.80**	1.00

Note : QoL-PHC: Quality of Life-Physical Health Composite, QoL-MHC: Quality of Life-Mental Health Composite, *$p < 0.05$ **p<0.01

in a study including MS patients and healthy groups, it was reported that neural activity in the dorsolateral prefrontal cortex region of MS patients was decreased compared to the control group.[33] Therefore, the predominance of neurotic personality traits in MS patients may be explained by the destruction of the central nervous system and neuronal activity caused by MS. However, in a recent study, quite remarkable results were presented. In this study conducted by Kang (2023) with a very large sample group, it was reported that individuals with positive personality traits (openness and conscientiousness) had a reduced risk of being diagnosed with MS within seven years. It was also stated that personality traits may be a risk factor for MS.[34] Therefore, it is unclear whether the personality traits of individuals are affected by MS or whether individuals who already have negative personality traits are diagnosed with MS. In this case, it is difficult to explain the reason for the dominance of neuroticism personality trait and the weakness of extraversion trait in MS patients in our study. Therefore, it can be said that more studies are needed to understand

Table 5: Lineer regression analysis for predicting quality of life in MS patients

	QoL-PHC						
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95 % Confident Interval	
	B	Std. Error	β			Lower Bound	Upper Bound
(Constant)	74,877	7.908		9.468	<0.001	59.119	90.634
Neuroticism	-1.855	1.274	-.162	-1.456	.150	-4.394	.684
Psychoticism	-1.409	2.136	-.068	-.660	.511	-5.665	2.847
Extraversion	3.081	1.587	.177	1.942	.056	-.081	6.243
Depression	-1.002	.338	-.412	-2.965	**.004**	-1.676	-.329
Stigma	-.118	.157	-.090	-.753	.454	-.431	.194
QoL-MHC							
(Constant)	74.057	6.146		12,050	<0.001	61.811	86.304
Neuroticism	-3.294	.990	-.378	-3.326	**.001**	-5.267	-1.321
Psychoticism	-1.647	1.660	-.104	-.992	.324	-4.955	1.660
Extraversion	1.447	1.233	.109	1.173	.245	-1.011	3.904
Depression	-.378	.263	-.204	-1.437	.155	-.901	.146
Stigma	-.099	.122	-.099	-.810	.420	-.342	.144

Note : QoL-PHC: Quality of Life-Physical Health Composite, QoL-MHC: Quality of Life-Mental Health Composite

whether personality traits are a cause or an effect.

In our study, the extraversion personality score was found to be lower in MS patients with high neurotic personality traits. Extraversion personality trait refers to being more socially active and friendly, being with other people instead of being alone, and having a more optimistic view of events. It is emphasized that extroverted individuals have better self-management skills, coping strategies, treatment adherence and better physical and cognitive functions, in other words, they have a positive coping mechanism.[3,35] A recent review study reported that personality traits such as conscientiousness, agreeableness and extraversion were lower and neurotic personality traits were more dominant in MS patients.[14] Different studies have also reported that neuroticism is a dominant personality trait in MS patients[8,9] and this situation is similar to our current study.

When sociodemographic characteristics and personality traits were compared in MS patients, a significant difference was found only according to marital status. Psychoticism personality score was found to be higher in divorced patients. It has been reported in different studies that marriage and relationship problems are more common in individuals with psychotic personality traits and that they should receive support.[36,37] On the contrary, positive personality traits (such as extraversion, openness) have been reported to strengthen the relationship between spouses and are positively related to marriage satisfaction.[38,39] The high level of psychoticism personality trait in divorced individuals in this study supports this finding. In addition, the rates of patients experiencing problems in their school, work and private lives due to their disease were found to be 7.5%, 21.2% and 26.2%, in our current study, respectively. Considering this result, it can be said that the private life of the patient (marriage, dating, marriage problems, etc.) is most commonly affected by MS. More importantly, psychoticism and neuroticism personality traits were higher in individuals who reported having problems in their personal life. This reveals the effect of personality traits on social life in MS patients.

Another important aim of this study is to reveal the relationship between personality traits and depression, stigmatization and quality of life. It was found that the personality traits of MS patients showed significant correlations with all these variables. Extraversion personality trait was found to be negatively associated with depression and stigmatization and positively associated with quality of life. In different studies, it was reported that extraverted personality trait was associated with a decrease in negative mood (anxiety, depression, etc.) [40,41] and an increase in quality of life.[3,7] The negative correlation between stigmatization and extraversion in this study suggests that extraverted individuals feel less stigmatized. Considering that stigma increases depressive mood[42,43] and worsens quality of life[44] in MS patients, it can be said that personality traits have direct and indirect effects on psychosocial life. On the contrary to extraversion, neuroticism and psychoticism each showed positive correlations with depression and stigmatization and negative correlations with quality of life. In this case, it can be interpreted that negative personality traits (neuroticism and psychoticism) may increase the level of stigmatization and depression and thus negatively affect quality of life. Patients with impaired emotional well-being, in other words, psychosocially affected patients are expected to have a more difficult adaptation process to treatment or illness.[45] Since MS requires long-term follow-up and treatment and compliance with immunomodulatory therapy is particularly important, the emotional state of patients should be closely assessed. Clinical psychologists should assess the patient's personality characteristics (long or short scales can be used depending on the situation) and other relevant psychosocial factors and inform the physicians and nurses providing treatment and care. Psychological support should also be provided if necessary.

These personality traits, which can be defined as negative personality traits, have been reported to be significantly associated with depression in many studies. It has been reported that neurotic personality traits are more dominant in MS patients and are associated with psychiatric factors such as anxiety and depression.[31,40,46,47] Considering the effects of factors such as anxiety and depression on quality of life, it is not surprising that negative personality traits are associated with quality of life. Moreover, it is an important finding that these personality traits are positively correlated with stigmatization. As a matter of fact, in this study, stigmatization had a significant relationship with depression and quality of life. This shows that personality traits contribute directly and indirectly to quality of life. Therefore, since the obtained data show that personality traits are closely related to individuals' psychosocial life and quality of life, psychosocial and personality traits of MS patients should be evaluated in detail in clinics in addition to their medical knowledge.

In conclusion, one of the important findings of this study is that neurotic personality traits are more dominant in MS patients. Although this is thought to be due to the effect of MS on brain functions, more powerful studies including neuroradiological imaging may be recommended. It is also noteworthy that neuroticism is positively correlated with stigma and depression and negatively correlated with quality of life. This suggests that neuroticism may directly affect the patient's well-being, ability to manage the disease and treatment compliance. Therefore, personality traits of MS patients should be assessed in the clinic with simple and understandable scales and disease management of individuals with predominant negative personality traits should be closely monitored. In fact, studies investigating personality traits and treatment/disease adherence in MS patients are recommended.

The limitations of this study is the relatively low sample size in this study and the fact that it was conducted in a single center can be shown as the limitation of the study. In addition, the fact that personality traits were obtained with the Eysenck Personality Questionnaire-Revised Short Form can be shown among the limitations since this inventory shows only three different personality traits. Therefore, scales (such as NEO Five-Factor Inventory) should be used to evaluate personality traits in more detail in future studies. In addition, although the design of the study was strengthened by using a control group, the lack of further diagnostic tests to reveal the relationship between MS and personality traits can be shown among the weaknesses of the study.

DISCLOSURE

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REFERENCES

1. Dobson R, Giovannoni G. Multiple sclerosis – a review. *Eur J Neurol* 2019;26: 27-40. doi: 10.1111/ene.13819.
2. Washington F, Langdon D. Factors affecting adherence to disease-modifying therapies in multiple sclerosis: systematic review. *J Neurol* 2022;269:1861-72. doi: 10.1007/s00415-021-10850-w.
3. Maggio MG, Cuzzola MF, Latella D, *et al*. How personality traits affect functional outcomes in patients with multiple sclerosis: A scoping review on a poorly understood topic. *Mult Scler Relat Disord* 2020;46:102560. doi: 10.1016/j.msard.2020.102560.
4. Bruce JM, Lynch SG. Personality traits in multiple sclerosis: Association with mood and anxiety disorders. *J Psychosom Res* 2011;70:479-85. doi: 10.1016/j.jpsychores.2010.12.010.
5. Dietmaier JM, von dem Knesebeck O, Heesen C, Kofahl C. Personality and its association with self-management in multiple sclerosis. *Mult Scler Relat Disord* 2022;61:103752. doi: 10.1016/j.msard.2022.103752.
6. Bustos K, Navarra J, Godoy M, González M. Personality styles and adherence to treatment in adult patients with multiple sclerosis. *Mult Scler Relat Disord* 2022;60:103699. doi: 10.1016/j.msard.2022.103699.
7. Zarbo IR, Minacapelli E, Falautano M, Demontis S, Carpentras G, Pugliatti M. Personality traits predict perceived health-related quality of life in persons with multiple sclerosis. *Mult Scler* 2016;22:551-8. doi: 10.1177/1352458515594045.
8. Kever A, Walker ELS, Riley CS, Heyman RA, Xia ZQ, Leavitt VM. Association of personality traits with physical function, cognition, and mood in multiple sclerosis. *Mult Scler Relat Disord* 2022;59:1-15. doi: 10.1016/j.msard.2022.103648.
9. Davidescu EI, Odajiu I, Tulbă D, Cucu C, Popescu BO. Characteristic personality traits of multiple sclerosis patients—An unicentric prospective observational cohort study. *J Clin Med* 2021;10:1-10. doi: 10.3390/jcm10245932.
10. Ghahremani A, Farkhani SM, Baniasadi M, *et al*. Personality traits of patients with multiple sclerosis and their correlation with anxiety and depression levels: A cross-sectional case–control study. *Brain Behav* 2022;12:1-9. doi: 10.1002/brb3.2596.
11. Estrada-López M, Reguera-García MM, Pérez Rivera FJ, Molina AJ. Physical disability and personality traits in multiple sclerosis. *Mult Scler Relat Disord* 2020;37:101465. doi: 10.1016/j.msard.2019.101465.
12. Jacot de Alcântara I, Voruz P, Allali G, *et al*. Personality as a predictor of disability in multiple sclerosis. *Arch Clin Neuropsychol* 2023;38(5):657-66. doi: 10.1093/arclin/acad010.
13. Raimo S, Trojano L, Gaita M, Spitaleri D, Santangelo G. High openness and high extroversion are linked with better time-based prospective memory in multiple sclerosis. *J Neurol* 2019;266:2665-71. doi: 10.1007/s00415-019-09460-4.
14. Szcześniak M, Potemkowski A, Brola W, *et al*. The big five personality traits and positive orientation in Polish adults with multiple sclerosis: The role of meaning in life. *Int J Environ Res Public Health* 2022;19(9):5426. doi: 10.3390/ijerph19095426.
15. Goretti B, Portaccio E, Zipoli V, *et al*. Coping strategies, psychological variables and their relationship with quality of life in multiple sclerosis. *Neurol Sci* 2009;30:15-20. doi: 10.1007/s10072-008-0009-3.
16. Salhofer-Polanyi S, Friedrich F, Loffler S, *et al*. Health-related quality of life in multiple sclerosis: temperament outweighs EDSS. *BMC Psychiatry* 2018;18:143. doi: 10.1186/s12888-018-1719-6.
17. Solmi M, Granziol U, Danieli A, *et al*. Predictors of stigma in a sample of mental health professionals: Network and moderator analysis on gender, years of experience, personality traits, and levels of burnout.

Eur Psychiatry 2020;63(1):e4. doi: 10.1192/j.eurpsy.2019.14.
18. Ingram PB, Lichtenberg JW, Clarke E. Self-stigma, personality traits, and willingness to seek treatment in a community sample. *Psychol Serv* 2016;13: 300-7. doi: 10.1037/ser0000086.
19. Brown SA. The contribution of previous contact and personality traits to severe mental illness stigma. *Am J Psychiatr Rehabil* 2012;15:274-89. doi: 10.1080/15487768.2012.703553.
20. Turan B, Crockett KB, Bukukcan-Tetik A, *et al*. Buffering internalization of HIV stigma: Implications for treatment adherence and depression. *J Acquir Immune Defic Syndr* 2019;80(3):284-91. doi: 10.1097/QAI.0000000000001915.
21. Thompson AJ, Banwell BL, Barkhof F. *et al*. Diagnosis of multiple sclerosis: 2017 revisions of the McDonald criteria. *Lancet Neurol* 2018;17:162-73. doi.org/10.1016/S1474-4422(17)30470-2
22. Francis LJ, Brown LB, Philipchalk R. The development of an abbreviated form of the revised Eysenck personality questionnaire (EPQR-A): Its use among students in England, Canada, the U.S.A. and Australia. *Pers Individ Dif* 1992;13: 443-9. doi: 10.1016/0191-8869(92)90073-X.
23. Eysenck SBG, Eysenck HJ, Borrett P. A revised version of the psychoticism scale. *Pers Individ Dif* 1985;6(1):21-9. doi: 10.1016/0191-8869(85)90026-1.
24. Karanci AN, Dirik G, Yorulmaz O. Reliability and validity studies of Turkish translation of Eysenck Personality Questionnaire Revised-Abbreviated. *Turk Psikiyatr Derg* 2007; 18(3):254-61.
25. National Institute of Neurological Disorders and Stroke. National Institute of Neurological Disorders and Stroke. User Manual for the Quality of Life in Neurological Disorders (Neuro-QoL) Measures, Version 2.0. 2015;vol. 17.
26. Karşidağ S, Çinar N, Şahin Ş, Kotevoğlu N, Ateş MF. Validation and reliability study of the turkish version of the neuroquality of life (Neuro-qol)-stigma scale for neurological disorders. *Turkish J Med Sci* 2019;49:789-94. doi: 10.3906/sag-1811-50
27. Beck A, Steer R, Brown G. Development; administration and scoring; psychometric characteristics. BDI-II, Beck Depress. Invent. Man. 1996.
28. Kapci EG, Uslu R, Turkcapar H, Karaoglan A. Beck depression inventory II: Evaluation of the psychometric properties and cut-off points in a Turkish adult population. *Depress Anxiety* 2008; doi:10.1002/da.20371.
29. Vickrey BG, Hays RD, Harooni R, Myers LW, Ellison GW. A health-related quality of life measure for multiple sclerosis. *Qual Life Res* 1995. doi:10.1007/BF02260859.
30. Idiman E, Uzunel F, Ozakbas S, *et al*. Cross-cultural adaptation and validation of multiple sclerosis quality of life questionnaire (MSQOL-54) in a Turkish multiple sclerosis sample. *J Neurol Sci* 2006;240(1-2):77-80. doi:10.1016/j.jns.2005.09.009.
31. Wimmelmann CL, Mortensen EL, Hegelund ER, Folker AP. Associations of personality traits with quality of life and satisfaction with life in a longitudinal study with up to 29 year follow-up. *Pers Individ Dif* 2020;156:109725. doi: 10.1016/j.paid.2019.109725
32. Yang J, Mao Y, Niu YH, Wei DT, Wang XQ. Qiu J. Individual differences in neuroticism personality trait in emotion regulation. *J Affect Disord* 2020;265: 468-74. doi: 10.1016/j.jad.2020.01.086.
33. Jaeger S, Paul F, Scheel M, *et al*. Multiple sclerosis–related fatigue: Altered resting-state functional connectivity of the ventral striatum and dorsolateral prefrontal cortex. *Mult Scler* 2019;25(4):554-64. doi: 10.1177/1352458518758911.
34. Kang W. Personality traits predict 7-year risk of diagnosis of multiple sclerosis: A prospective study. *J Clin Med* 2023;12:682. doi: 10.3390/jcm12020682.
35. Allen MS, Mison EA, Robson DA, Laborde S. Extraversion in sport: a scoping review. *Int Rev Sport Exerc Psychol* 2021;14:229-59. doi: 10.1080/1750984X.2020.1790024.
36. Mina S. Predictors of marriage in psychiatric illness: A review of literature. *J Psychiatry Psychiatr Disord* 03; 2019:14-22. doi: 10.26502/jppd.2572-519X0058.
37. Cloutier B, Francoeur A, Samson C, Ghostine A, Lecomte T. Romantic relationships, sexuality, and psychotic disorders: A systematic review of recent findings. *Psychiatr Rehabil* J 2021;44:22-42. doi: 10.1037/prj0000409.
38. Namvar H. The relationship between marital satisfaction of patients with multiple sclerosis (the patients' spouses) with the interpersonal dependency and personality type. *Am J Fam Ther* 2023;51:267-82. doi: 10.1080/01926187.2021.1967221.
39. Gromisch ES, Turner AP, Gangi A, Neto LO, Foley FW. What factors are associated with resilience in persons with multiple sclerosis? The role of personality traits. *Rehabil Psychol* 2022;67:575-81. doi: 10.1037/rep0000468.
40. Yu T, Hu J. Extraversion and neuroticism on college freshmen's depressive symptoms during the COVID-19 pandemic: The mediating role of social support. *Front Psychiatry* 2022;13. doi.org/10.3389/fpsyt.2022.822699
41. Olawa BD, Idemudia ES. The extraversion-neuroticism and geriatric depression relations: do social engagements and social supports have roles to play? *Heliyon* 2020;6:e05719. doi.org/10.1016/j.heliyon.2020.e05719
42. Tworek G, Thompson NR, Kane A, Sullivan AB. The impact of stigma on perceived quality of life and experience of anxiety and depression in individuals diagnosed with MS. *Mult Scler Relat Disord* 2023;72:104591. doi: 10.1016/j.msard.2023.104591.
43. Yeni, K., Ozdelikara, A. & Terzi, M. Relationship between stigma and symptom burden in patients with multiple sclerosis. *Neurol Asia* 2023;28:359-66. doi: 10.54029/2023ddi.
44. Grothe L, Grothe M, Wingert J, Schomerus G, Speerforck S. Stigma in multiple sclerosis: The important role of sense of coherence and its relation to quality of life. *Int J Behav Med* 2022;29:517-23. doi: 10.1007/s12529-021-10030-0.
45. Kołtuniuk A, Rosińczuk J. The levels of depression, anxiety, acceptance of illness, and medication

adherence in patients with multiple sclerosis - descriptive and correlational study. *Int J Med Sci* 2021;18:216-25. doi: 10.7150/ijms.51172.
46. Lai HL, Chen CI, Lu CY, Yao YC, Huang CY. Relationships among personality, coping, and concurrent health-related quality of life in women with breast cancer. *Breast Cancer* 2019;26:544-51. doi: 10.1007/s12282-019-00954-7.
47. Pang Y, Wu S. Mediating effects of negative cognitive bias and negative affect on neuroticism and depression. *Curr Psychol* 2023;42:7060-9. doi: 10.1007/s12144-021-02052-4.